



THE
ONTARIO WATER RESOURCES
COMMISSION
WATER QUALITY SURVEY
OF
HIGHLAND CREEK

1964

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Report on water quality survey
of Highland Creek.

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REPORT
ON
A WATER QUALITY STUDY
OF
HIGHLAND CREEK

DIVISION OF SANITARY ENGINEERING
Ontario Water Resources Commission

November 1964

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INTRODUCTION

A routine water quality survey of Highland Creek was made on November 17, 1964. The purpose of the survey was to assess the quality of the water in this river. Of significance are the points at which any deterioration of the water is noted. When the laboratory results of samples collected indicate deterioration of the water quality, it is necessary that the cause be found and corrective action be taken by those concerned.

GENERAL

The Highland Creek Watershed provides drainage for 24,384 acres of mainly urban development. Highland Creek is situated entirely within the Township of Scarborough and discharges to Lake Ontario.

HYDROLOGY

Stream flow data is available from the Water Resources Branch of the Department of Northern Affairs and National Resources. The following information is taken from data at the West Hill stream gauging station.

From the year 1957 to 1962, the West Hill station has recorded an average daily discharge of 22.4 cubic feet per second. The maximum recorded flow of 743 cubic feet per second occurred on March 20, 1959. A minimum flow of one cubic foot per second was noted at various times in July of 1959. Flows for the year 1964 are noted below:

Maximum flow, July 13	-	513 cfs
Minimum flow, June 11,	-	
12, 14, 18, 20	-	5.8 cfs
Mean flow	-	<u>20.8 cfs</u>
Flow on November 17	-	9.4 cfs

WEATHER CONDITIONS

November 16th, the day preceding this survey was cloudy, overcast and .045 inches of rain fell during the day. On November 17th, it was cloudy to overcast in the morning, clearing in the afternoon with no precipitation. The high and low temperatures were 49°F. and 39°F.

OWRC WATER QUALITY OBJECTIVES

The following objectives are for all waters in the Province of Ontario:

<u>Item</u>	<u>Concentration</u>
5-day BOD	not greater than 4 ppm
MF Coliform Count	not greater than 2400 coliforms per 100 ml
Phenol - average	2 ppb
maximum	5 ppb
pH	6.7-8.5
Iron	0.3 ppm

Adequate protection for these waters, except in certain specific instances influenced by local conditions, should be provided if the following waste discharge concentrations are obtained:

<u>Item</u>	<u>Concentration</u>
5-day BOD	not greater than 15 ppm
Suspended Solids	not greater than 15 ppm
Phenol	not greater than 20 ppb
pH	5.5 to 10.6
Iron	not greater than 17 ppm
Oil	not greater than 15 ppm

SAMPLING PROCEDURE

"Grab" samples were collected for bacteriological examination and chemical analyses. The sampling points are indicated

on the map appended to this report. All laboratory tests were performed by the Ontario Water Resources Commission laboratory.

LABORATORY TESTS

Biochemical Oxygen Demand (BOD)

The BOD of sewage, polluted waters, or industrial wastes, is the oxygen required for stabilization (natural purification in a stream) of the decomposable organic matter of chemical material by aerobic biochemical action. Unless otherwise noted, a five-day BOD determination with incubation at 20°C. is reported. A high BOD is indicative of organic or chemical pollution. A desirable upper limit in natural water is four (4) parts per million.

Suspended Solids

These results are reported in parts per million and indicate the measure of undissolved solids or organic or inorganic nature. Where suspended solids values, ascertained by a quantitative analyses, approach 20 parts per million or less, laboratory difficulties usually result in these values being determined as turbidity a qualitative analysis, which is reported in turbidity units.

Phenols

Phenols are derivatives of benzene and other aromatic hydrocarbons. The Gibbs method is used for the determination of phenols in water. The presence of phenols in a stream is objectionable because of their strong bactericidal action, their toxicity to fish and the unpleasant tastes and odours produced when water containing phenols is chlorinated.

Membrane Filter Coliform Count

The membrane filter technique is employed to obtain a direct enumeration of coliform organisms and is reported per 100 millilitres. The presence of coliforms indicates pollution from human or animal excrement, or from some non-faecal forms. A membrane filter coliform count in excess of the desirable upper limit of 2,400 organisms is considered to render the water undesirable for bathing purposes.

LABORATORY RESULTS

As previously mentioned samples were collected for bacteriological examination and chemical analyses. Samples were collected from sixteen sampling points on Highland Creek and one from the Highland Creek sewage treatment plant final effluent. The laboratory results are listed in the appendix to this report.

Five or 31 per cent of the samples collected were in excess of the Commission's maximum objective of not greater than 4 ppm BOD, while eight or 50 per cent of the samples were in excess of the maximum objective of not greater than 2,400 coliform organisms per 100 ml.

The laboratory results of samples collected from the following sampling points exceeded the Commission's objective for BOD and/or coliform organisms:

HDE- 0.9; HDE- 2.0; HDS- 0.8; HD- 2.5; HDN- 5.3; HDNM- 6.6; HDWA- 11.3; HD- 9.8; ND- 4.8; HD- 8.0.

The sample collected from the Highland Creek sewage treatment plant effluent indicated it was within the Commission's objective of not greater than 15 ppm BOD. There was a considerable amount of foaming at the outfall with a maximum accumulation of 5 feet. There ^{in depth?}

were 7.5 ppm anionic detergents reported as ABS in the sample.

DISCUSSION

A number of problems of polluting wastes being discharged to Highland Creek have been located and recorded by the OWRC. The responsible person or persons have been asked to make the necessary corrections.

Landfill Sites

The Township of Scarborough at present is operating a sanitary landfill area on the east side of Morningside Ave. south of Highway No.401. This site lies in the Highland Creek Watershed. Inspections have been made of this location and there are no polluting wastes in the form of leachate being discharged to Highland Creek. The ground-water table is exposed in the filled area and the effect of pollution of ground water, if any, has not been determined. A survey will be conducted by the OWRC to establish the resultant effects of this filled area on the ground-water table.

A landfill site located at the north-west corner of Morningside Ave. and Ellesmere Rd. and formerly operated by the Township of Scarborough, discharges leachate to Highland Creek. The leachate should be directed to the sanitary sewer. It was reported that with the construction of the extension of Ellesmere Rd. west of Morningside Ave. the sewers will be installed and the wastes will be collected by the sanitary sewer.

A landfill site operated by the township and located at the north-east corner of McCowan's Rd. and Eglinton Ave. East is

situated in the watershed but there is no pollution problem as a result of this site.

Industries

An OWRC inspection report of October 24, 1963, investigated a complaint of oil being discharged from S.Consentino Limited to Highland Creek. The report recommended that the necessary preventative measures be taken by the company officials. On February 27, 1964, confirmation was received by this Commission regarding the corrective action taken by S.Consentino Limited indicating that this problem had been eliminated.

International Waxes Limited

The OWRC investigated a pollution complaint regarding this industry. It was determined that the company treats the wastes by means of a baffled interceptor. The action taken by the company has been satisfactory in eliminating the discharge of inadequately treated wastes.

Canadian Pacific Toronto Freight Yard

The results of an OWRC inspection indicated that the waste water from the car-washing area was polluting Malvern Creek a tributary of Highland Creek. It is suggested that the Canadian Pacific Railway Company discontinue the practice of discharging untreated wastes to the watercourse. Some experimental work has been carried out by the Metropolitan Toronto Department of Works on the use of chemicals in precipitating the solids in the wastes. Due to the strict control required to operate this system effectively,

it has been suggested that the wastes from the car-washing area be directed to the sanitary sewer.

Fish Kill

A report of a large accumulation of dead fish noted in Highland Creek was investigated by the OWRC. The investigating procedures used failed to indicate the cause of mortality of the fish identified as minnows and dace.

COMMENTS

The physical characteristics of the area drained by this watershed has changed in the past 10 years from mainly an agricultural area to an urbanized area. The resultant pollution problems associated with such a change has effected the water quality of Highland Creek. The Township of Scarborough in general has maintained an effective control of potential sources of pollution but there are problem areas that should be corrected by the various offenders responsible.

SUMMARY

A water quality survey of Highland Creek was conducted on November 17, 1964. The laboratory results of samples collected are appended to this report.

The problem areas located in this watershed have been discussed with the corrections required indicated.

RECOMMENDATIONS

1. The leachate from the abandoned Morningside Ave. landfill site should be directed to the sanitary sewer.

2. The discharge of inadequately treated wastes to Malvern Creek from the Canadian Pacific Toronto Freight Yard should be eliminated.
3. The Township of Scarborough should continue its programme of water pollution control.

All of which is respectfully submitted,

District Engineer:

H.Browne

Approved by:

K.H.Sharpe, Director

Prepared by: D.A.Murray Wilson

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SAMPLING POINT NO.	LOCATION & DESCRIPTION	DATE	5-DAY BOD	TOTAL SOLIDS	SUSPENDED SOLIDS	TURBIDITY IN SILICA UNITS	MF COLIFORM COUNT/100 ML	PHENOLS IN PPB	ANIONIC DETERGENTS AS ABS
HD-0.0	HIGHLAND CREEK AT LAKE ONTARIO	MAY 10/61	15	698	--	16	12	17	
		JULY 26/61	9	584	--	15	2,160,000	0	
		DEC.5/62	19	642	86	--	30	--	
		JUNE 6/63	5.4	616	--	23.0	2	--	
		OCT.22/64	16	612	28	--	0	12	
		Nov.17/64	2.4	604	10	--	30	20	
HD-0.1T	HIGHLAND CREEK SEWAGE TREATMENT PLANT OUTFALL	MAY 10/61	43	760	50	--	20	--	
		JULY 26/61	68	792	84	--	3,700,000	--	
		DEC.5/62	39	652	69	--	20	--	
		Nov.17/64	2.2	604	8	--	20	--	7.5
HDE-0.3	EAST BRANCH JUST ABOVE JUNCTION (JOHNS-MANVILLE)	Nov.17/64	1.7	720	3	--	0	--	
HDE-0.9	EAST BRANCH AT COL. DANFORTH TRAIL	MAY 10/61	2.5	596	--	2	7	--	
		JULY 26/61	0.7	564	--	1	85,000	--	
		DEC.5/62	2.6	580	--	2.8	3,400	--	
		JUNE 6/63	0.9	750	--	1.8	70	--	
HDE-2.0	EAST BRANCH AT HWY. #2	MAY 10/61	3.6	546	--	6	400	--	
		JULY 26/61	0.5	540	--	1	65,000	--	
		DEC.5/62	2.7	528	--	2.5	19,800	--	
		JUNE 6/63	1.3	672	--	1.5	6,300	--	
		Nov.17/64	2.0	620	3	--	4,900	--	
HDS-0.8	SOUTH BRANCH AT BEECHGROVE DR.	MAY 10/61	2.8	568	--	3	27	--	
		JULY 26/61	2.2	496	--	5	72,000	--	
		DEC.5/62	3.2	564	--	5	27,000	--	
		JUNE 6/63	1.2	390	--	1.8	5,700	--	
		Nov.17/64	3.5	800	118	--	4,300	--	
HDSN-0.9	NORTH TRIBUTARY SOUTH BRANCH AT BEECHGROVE DR.	DEC.5/62	2.2	614	--	8	150	--	
		JUNE 6/63	1.6	638	--	14	2,900	--	
		Nov.17/64	2.7	700	38	--	76	--	

SAMPLING POINT No.	LOCATION & DESCRIPTION	DATE	5-DAY BOD	TOTAL SOLIDS	SUSPENDED SOLIDS	TURBIDITY IN SILICA UNITS	MF COLIFORM COUNT/100 ML
HD-2.5	HIGHLAND CREEK AT OLD KINGSTON RD.	MAY 10/61	2.8	542	--	5	23
		JULY 26/61	0.8	480	--	4	4000
		DEC.5/62	2.1	530	--	6	11,900
		JUNE 6/63	2.0	530	--	1.8	36
		NOV.17/64	4.0	596	19	--	
HDN-5.3	NORTH BRANCH AT MILITARY TRAIL	MAY 10/61	3.9	482	--	3	3
		JULY 26/61	0.6	392	--	4	11,000
		DEC.5/62	3.2	480	--	4.5	700
		JUNE 6/63	1.6	448	--	3.5	400
		NOV.17/64	2.4	684	3	--	3,500
HDN-6.6	MALVERN CREEK AT SHEPPARD AVE.	MAY 10/61	2.2	418	--	7	4
		JULY 26/61	0.9	418	--	4	24,000
		DEC.5/62	2.2	512	--	3.6	34
		JUNE 6/63	1.1	450	--	2.8	700
		NOV.17/64	11	878	5	--	3,800
HDN-6.5	NORTH BRANCH AT MARKHAM RD.	MAY 10/61	2.6	506	--	3	2
		JULY 26/61	1.0	450	--	7	3,170
		DEC.5/62	3.1	640	--	10.5	18
		JUNE 6/63	2.0	504	--	9	2,800
		NOV.17/64	1.8	568	30	--	1,700
HDNW-8.8	WEST TRIBUTARY NORTH BRANCH AT SHEPPARD AVE.	MAY 10/61	2.6	530	--	4	600
		JULY 26/61	1.2	408	--	3	6,000
		DEC.5/62	3.2	732	--	24	120
		NOV.17/64	2.6	550	8	--	1,900
HD-4.8	HIGHLAND CREEK AT LAWRENCE AVE.	MAY 10/61	3.3	604	--	5	43
		JULY 26/61	1.0	518	--	8	900
		DEC.5/62	4.1	578	--	3.6	12,700
		JUNE 6/63	1.5	538	--	3.5	1,100
		NOV.17/64	4.6	723	229	--	12,00

SAMPLING POINT No.	LOCATION & DESCRIPTION	DATE	5-DAY BOD	TOTAL SOLIDS	SUSPENDED SOLIDS	TURBIDITY IN SILICA UNITS	MF COLIFORM COUNT/100 ML
HDW-7.8	WEST BRANCH AT LAWRENCE AVE.	MAY 10/61	4.5	432	--	4	27
		JULY 26/61	1.4	466	--	1	880
		DEC.5/62	3.4	448	--	4	2,200
		JUNE 6/63	1.5	438	--	2.1	2,300
		Nov.17/64	2.9	452	4	--	1,600
HOWA-11.3	AGINCOURT CREEK AT SHEPPARD AVE.	MAY 10/61	4.6	460	--	3	117
		JULY 26/61	4.2	708	--	2	2,930
		DEC.5/62	3.9	524	--	6	1,900
		JUNE 6/63	2.2	488	--	9	3,300
		Nov.17/64	12	552	12	--	30,000
HD-8.0	HIGHLAND CREEK AT DANFORTH RD.	MAY 10/61	1.4	818	--	4	1,360
		JULY 26/61	1.9	554	--	2	1,900
		DEC.5/62	3.9	724	--	4.5	12,300
		JUNE 6/63	6.0	718	--	6.5	2,900
		Nov.17/64	7.2	774	22	--	0
HD-9.8	HIGHLAND CREEK AT LAWRENCE AVE.	MAY 10/61	2.7	774	--	3	126
		JULY 26/61	1.2	464	--	3	4,000
		DEC.5/62	8.0	586	--	20	27,000
		JUNE 6/63	2.2	688	--	3.3	8,800
		Nov.17/64	18	398	16	--	7,100